All India Test Series (2023-24)

Test Code: ANY/03

AITS TEST - 03

YAKEEN NEET

DURATION: 200 Minutes | **DATE: 04/02/2024** | **M. MARKS: 720**

Topics Covered

Physics:	AITS-2 + Mechanical Properties of Fluids, Thermal Properties of Matter (Including Newton's Law of Cooling and Stefan's Law), Kinetic Theory of Gases and Thermodynamics, Simple Harmonic Motion, Waves
Chemistry:	AITS-2 + Equilibrium, General Organic Chemistry, HYDROCARBON
Botany:	AITS-2 + Photosynthesis in Higher Plants, Respiration in Plants
Zoology:	AITS-2 + Chemical Coordination and Integration

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours 20 minutes** duration and the Test Booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** questions in each subject are divided into **two sections (A and B)** as per details given below:
   (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos. – 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All Questions are compulsory.
   (b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (Question Nos. – 36 to 50, 86 to 100, 136 to 150 and 186 to 200). In section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.
   Candidates are advised to read all 15 questions in each subject of Section-B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.**
3. There is only one correct response for each question.
4. Each **correct** answer will give **4 Mark** while **1 Mark** will be **deducted** for a **wrong** answer. The maximum marks are 720.
5. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
6. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

OMR Instructions:

1. Use blue/black dark ballpoint pen.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

Name of the Student (In CAPITALS): _____

Roll Number: _____

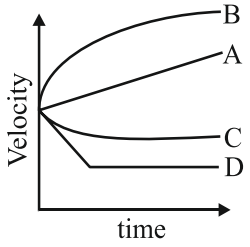
OMR Bar Code Number: _____

Student's Signature: _____ **Invigilator's Signature** _____

(PHYSICS)

SECTION-A

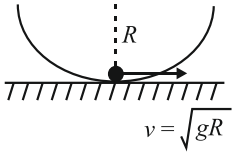
1. A small ball is thrown in a viscous liquid in a tall container from a large height with a speed greater than the terminal speed of the ball. The **correct** graph of its velocity with time is;
(density of ball > density of liquid)



(1) A (2) B
(3) C (4) D

2. A quantity of air (γ = 1.4) at 30°C is compressed suddenly, the temperature of the air will;
(1) Fall
(2) Rise
(3) Remain unchanged
(4) First rise and then fall

3. A small ball is placed at the bottom of a frictionless cylindrical drum of radius *R*. The ball is given a speed $\sqrt{gR}$ at the lowest point in the plane of the paper as shown. Find the maximum height of the ball above the ground.



(1) R (2) $\frac{R}{4}$
(3) $\frac{R}{3}$ (4) $\frac{R}{2}$

4. If the displacement x and velocity v of a particle executing SHM are related through the expression $4v^2 = 25 - x^2$, then its time period (in s) is;
(1) π (2) 2π
(3) 4π (4) 6π

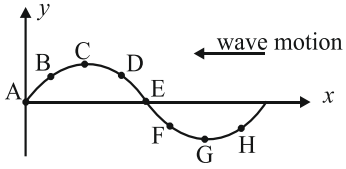
5. A body is cooling according to Newton's law of cooling. The temperature of the body falls from 50°C to 40°C in 10 minutes. The time in which its temperature falls from 40°C to 30°C is;
(1) equal to 10 minutes
(2) less than 10 minutes
(3) more than 10 minutes
(4) data insufficient

6. Two waves are represented by the equations $y_1 = a\sin(\omega t + kx + 0.57)\ m$ and $y_2 = a\cos(\omega t + kx)\ m$, where x is in metre and t in second. The phase difference between them is approximately;
(1) 1.25 rad (2) 1.57 rad
(3) 0.57 rad (4) 1 rad

7. A barometer kept in a stationary elevator reads 76 cm. If the elevator starts accelerating up, the reading will be;
(1) Zero (2) Equal to 76 cm
(3) More than 76 cm (4) Less than 76 cm

8. What is that temperature at which the Fahrenheit reading is double than that of the Celsius reading?
(1) 160°F (2) 160°C
(3) 320°C (4) 80°F

9. A transverse wave is travelling along a stretched string from right to left. The figure shown, represents the shape of the string (snapshot) at a given instant. At this instant;



(1) the particles at A, B and H have downward velocity
(2) the particles at D, E and F have downward velocity
(3) the particles at C, E and G have zero velocity
(4) the particles at A and F have maximum velocity

10. A simple pendulum is displaced from its mean position to initiate oscillations. The torque of which of the following force acting on the pendulum tries to restore it back to the mean position?
(1) Tension in the string
(2) Centripetal force
(3) Centrifugal force
(4) Component of weight

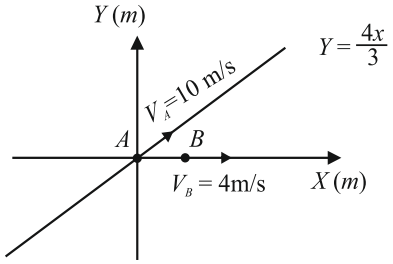
11. In a guitar, two strings A and B, made of same material are slightly out of tune and produce beats of frequency 6 Hz. When tension in B is slightly increased, the beat frequency increases to 7 Hz. If the frequency of A is 530 Hz, the original frequency of B will be;
(1) 524 Hz (2) 536 Hz
(3) 537 Hz (4) 523 Hz

12. A glass flask of volume 200 cm^3 is just filled with mercury at 20°C. The amount of mercury that will overflow when the temperature of the system is raised to 30°C will be; ($\gamma_{glass} = 1.2 \times 10^{-5}$/C°, $\gamma_{mercury} = 1.8 \times 10^{-4}$/C°)

(1) 3.36 cm^3 (2) 0.336 cm^3

(3) 33.6 cm^3 (4) 3.36×10^{-2} cm^3

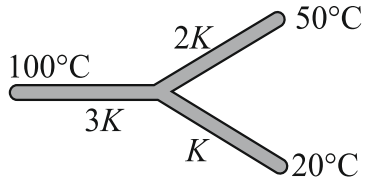
13. A particle *A* of mass 2 kg is moving along the line $Y = \frac{4x}{3}$ as shown in the figure with speed 10 m/s. Another particle *B* of mass 2 kg moves along + ve *x*-axis with speed 4 m/s. The speed of C.O.M. of the system of two particles *A* and *B* is;



(1) $\frac{13}{2}$ m/s (2) $\sqrt{41}$ m/s

(3) $\sqrt{45}$ m/s (4) 5 m/s

14. Three rods of the same dimension have thermal conductivities 3*K*, 2*K* and *K*. They are arranged as shown in the figure. Their ends are at 100°C, 50°C and 20°C. The temperature of their junction is;



(1) 60°C (2) 70°C

(3) 50°C (4) 35°C

15. Six particles each of mass *m* are connected to the corners of a light regular hexagonal frame of side length '*l*'. Find the moment of inertia about an axis passing through any one of the vertex and perpendicular to the plane of the frame.

(1) 6 $m\ell^2$ (2) 12 $m\ell^2$

(3) 10 $m\ell^2$ (4) 5 $m\ell^2$

16. *N* moles of an ideal gas is heated at constant temperature *T* K to increase its volume by 100%. Work done by the gas is (*R* = gas constant)

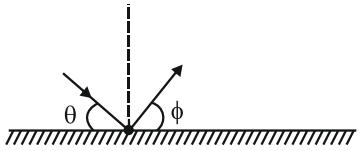
(1) *NRT ln*2

(2) *NRT*

(3) *NRT* $\log_{10} 2$

(4) Zero

17. A ball hits a fixed smooth floor at an angle θ with the floor as shown. The coefficient of restitution '*e*' for the collision is given to be between 0 and 1. What is the **correct** relation between angle θ and ϕ? (ϕ is the angle made by the velocity vector of the ball with the floor just after collision)



(1) θ = ϕ

(2) θ > ϕ

(3) θ < ϕ

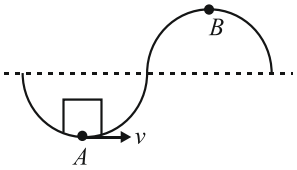
(4) θ may be greater than or less than ϕ depending on exact value of *e*.

18. The fundamental frequency in an open organ pipe is equal to the third harmonic of a closed organ pipe. If the length of the closed organ pipe is 20 cm, the length of the open organ pipe is;

(1) 12.5 cm (2) 8 cm

(3) 13.3 cm (4) 16 cm

19. A curved path is constructed using two semicircular tracks of same radius *R* as shown. A particle moves with constant speed *v* without losing any contact with the track.



The magnitude of centripetal force is;

(1) Greater at *A* than at *B*

(2) Lesser at *A* than at *B*

(3) Equal at *A* and *B*

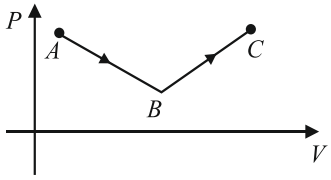
(4) Cannot be determined.

20. Ratio of rms speed of hydrogen molecules to the oxygen molecules at room temperature 27°C is;

(1) 4 : 1 (2) 2 : 1

(3) 8 : 1 (4) 16 : 1

21. A gas is going through two thermodynamic process *AB* and *BC* as shown in the *P*–*V* diagram. The work done by the gas as it goes from $A \rightarrow B \rightarrow C$;



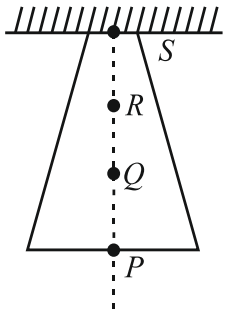
(1) Continuously increases

(2) Continuously decreases

(3) First increases and then decreases

(4) First decreases and then increases

22. A rod having uniform density in the shape of a tapered bar as shown below, is hung from the ceiling. The mass of the rod is 'm' and length is l. Four points P, Q, R and S are marked on the rod. The normal stress is maximum at the cross section passing through the point;



(1) P
(2) Q
(3) R
(4) S

23. If temperature of ideal black body is increased by 10%, then percentage increase in quantity of radiation emitted from its surface will be;
(1) 10%
(2) 40%
(3) 46%
(4) 100%

24. A spring block system has a time period T when it oscillates in the vertical plane as shown in figure (a). The same spring block system is made to oscillate on a frictionless fixed incline as shown in figure (b). What can be said about the time period of oscillation?

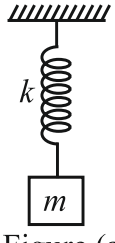


Figure (a)

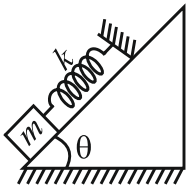


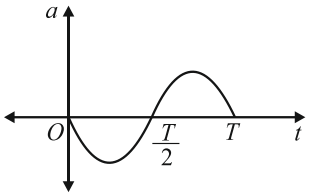
Figure (b)

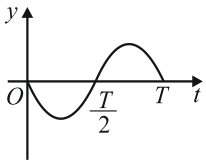
(1) It increases
(2) It decreases
(3) It remains same
(4) May increase or decrease depending on the angle θ.

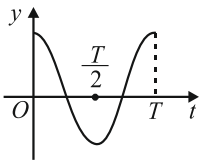
25. Two rods of identical dimension and thermal conductivities 3k and 5k are connected in parallel between two reservoirs at different temperatures. Effective thermal conductivity of the parallel combination is;
(1) 2.5 k (2) 2.4 k
(3) 2 k (4) 4 k

26. A body at temperature 7°C emits radiation of energy E in unit time. If the temperature is increased to 77°C then the emitted energy per unit time will be;
(1) 10^4E (2) $\frac{625E}{256}$
(3) 10^3E (4) $\frac{625E}{128}$

27. A body is executing simple harmonic motion whose acceleration a versus time t graph is shown in figure. Its corresponding position y versus time t graph is;



(1)


(2)


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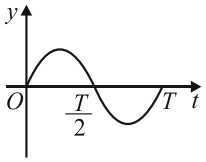
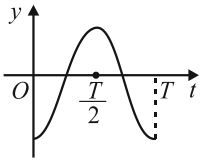


(4)


28. A monoatomic gas absorbs 30 J at constant volume to raise its temperature by t°C. The amount of heat used by it to increase its internal energy is;
(1) 20 J
(2) 10 J
(3) 30 J
(4) Depends on the value of t

29. A uniform rope of length L and mass m_1 hangs vertically from a rigid support. A block of mass m_2 is attached to the free end of the rope. A transverse pulse of wavelength λ_1 is produced at the lower end of the rope. The wavelength of the pulse when it reaches the top of the rope is λ_2. The ratio $\frac{\lambda_2}{\lambda_1}$ is;
(1) $\sqrt{\frac{m_1+m_2}{m_2}}$ (2) $\sqrt{\frac{m_2}{m_1}}$
(3) $\sqrt{\frac{m_1+m_2}{m_1}}$ (4) $\sqrt{\frac{m_1}{m_2}}$

30. Two consecutive frequencies from an open organ pipe are 100 Hz and 150 Hz. The fundamental frequency of the organ pipe is;
(1) 50 Hz (2) 75 Hz
(3) 125 Hz (4) 25 Hz

31. 5 gm of steam at 100°C is passed into 6 gm of ice at 0°C. If the latent heats of steam and ice in cal per gm are 540 and 80 respectively, then the final temperature is;

(1) 0°C (2) 100°C
(3) 50°C (4) 30°C

32. If a graph is plotted by taking velocity along y-axis and displacement of particle in SHM along *x*-axis, then the nature of the graph is;

(1) Straight line
(2) Ellipse
(3) Parabola
(4) Hyperbola

33. A transverse wave is represented by the equation $y = y_0 \sin\frac{2\pi}{\lambda}(vt - x)$. For what value of λ is the maximum particle velocity equal to three times the wave velocity?

(1) $\lambda = 2\pi y_0$ (2) $\lambda = \frac{2\pi y_0}{3}$

(3) $\lambda = \frac{\pi y_0}{2}$ (4) $\lambda = \pi y_0$

34. If the potential energy of two molecules is given by, $U = \frac{A}{r^6} - \frac{B}{r^3}$ then at equilibrium position, its potential energy is equal to;

(1) $\frac{A^2}{4B}$ (2) $-\frac{B^2}{4A}$

(3) $\frac{2B}{A}$ (4) $3A$

35. A spring mass system has time period *T*. If the spring is cut into four identical parts and same mass is loaded to one of them, then new time period of vibration is;

(1) T (2) $\frac{T}{2}$

(3) $\frac{T}{4}$ (4) $2T$

SECTION-B

36. A simple pendulum has time period *T* on the surface of moon. Its time period on the earth's surface is *xT*, then *x* is;

(1) $\frac{1}{\sqrt{6}}$ (2) $2\sqrt{6}$

(3) $\frac{2}{\sqrt{6}}$ (4) $\sqrt{6}$

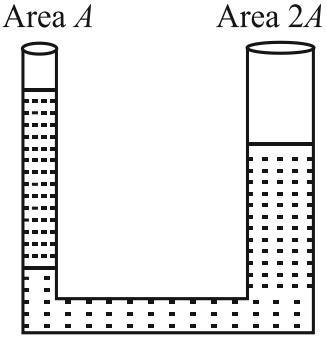
37. A 5.5 m length of string has a mass of 0.035 kg. If the tension in the string is 77N, the speed of a wave on the string is;

(1) 110 ms^{-1}
(2) 165 ms^{-1}
(3) 77 ms^{-1}
(4) 102 ms^{-1}

38. A iron bar (Young's modulus = 10^{11} N/m^2, $\alpha = 10^{-6}$ /°C) 1 m long and 10^{-3} m^2 in area is heated from 0°C to 20°C without being allowed to bend or expand. Find the compressive force developed inside the bar.

(1) 1000 N
(2) 2000 N
(3) 500 N
(4) 100 N

39. A U-tube is made up of non-uniform cross section as shown in the figure, is partially filled with water. Oil which does not mix with water is next poured into one side, until water rises by 5 cm on the other side. If the density of the oil is 0.8g/cc, the oil level will stand higher than the water level by;



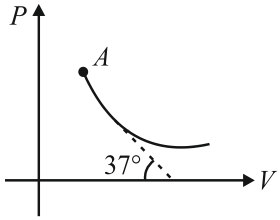
(1) 6.25 cm
(2) 12.50 cm
(3) 3.75 cm
(4) 25.00 cm

40. **Statement I:** For production of beats the two sources must have different frequencies but same amplitude.

Statement II: For production of beats the two sources must have different frequencies but same phase.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

41. The P–V graph for an isothermal process on an ideal gas is shown below.



The tangent at A makes an angle 37° with ($-V$) axis. If the process is carried out adiabatically starting from A the angle made by the tangent with $-V$ axis at point A will be; (consider $\gamma_{gas} = \frac{4}{3}$)

(1) 60° (2) 30°

(3) 53° (4) 45°

42. Two wires are made of the same metal. The length of the first wire is half that of the second wire and its diameter is double of the second wire. If equal loads are applied on both the wires, find the ratio of increase in their lengths.

(1) $\frac{1}{4}$ (2) $\frac{1}{8}$

(3) $\frac{1}{2}$ (4) $\frac{1}{16}$

43. Two rotating bodies A and B of masses m and $2m$ with moments of inertia I_A and $I_B (I_B > I_A)$ have equal kinetic energy of rotation. If L_A and L_B be their angular momentum respectively, then;

(1) $L_A = \frac{L_B}{2}$ (2) $L_A = 2L_B$

(3) $L_B > L_A$ (4) $L_A > L_B$

44. A body is executing simple harmonic motion with frequency n, the frequency of its potential energy is;

(1) n (2) $2n$

(3) $3n$ (4) $4n$

45. A body of density ρ is thrown at $t = 0$ with speed v, into a lake of density σ from the surface, (where $\sigma > \rho$). Neglecting all dissipative forces, the time taken by the body to return to the surface is;

(1) $\frac{2v\sigma}{(\sigma-\rho)g}$

(2) $\frac{2v\rho}{(\sigma-\rho)g}$

(3) $\frac{2v}{(\sigma-\rho)g}$

(4) $\frac{2v}{(\rho-\sigma)g}$

46. **Assertion (A):** Assuming Stokes law to be valid, if the speed of a spherical ball is doubled and the radius is halved, the magnitude of viscous force remain same.

Reason (R): In Stokes law viscous force is proportional to the product of radius and speed.

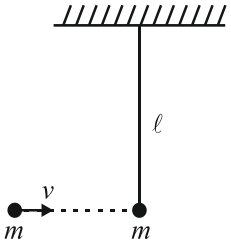
(1) Both **Assertion (A)** and **Reason (R)** are true and the **Reason (R)** is the **correct** explanation of the **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is not the **correct** explanation of the **Assertion (A)**.

(3) **Assertion (A)** is true but **Reason (R)** is false.

(4) Both **Assertion (A)** and **Reason (R)** are false.

47. A simple pendulum of mass m is suspended from a string of length ℓ. Another body having same mass hits the pendulum perfectly inelastically as shown. Find the minimum speed v of the ball such that the system of two balls just complete the vertical circle.



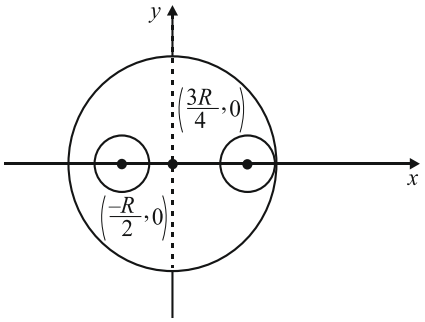
(1) $\sqrt{5g\ell}$

(2) $2\sqrt{5g\ell}$

(3) $3\sqrt{5g\ell}$

(4) $4\sqrt{5g\ell}$

48. A uniform circular plate has mass M and radius R is kept with its centre at origin. Two discs of radius $\frac{R}{4}$ each are removed from the original disc as shown in figures.



Find out the X-coordinate of centre of mass after removing the two smaller discs.

(1) $-\frac{R}{56}$ (2) $+\frac{R}{56}$

(3) $\frac{R}{42}$ (4) $-\frac{R}{42}$

49. A wheel is rotating about an axis through its centre at 720 r.p.m. It is acted upon by a constant torque opposing its motion for 8 second to finally bring it to rest. The value of torque in N-m is; (given $I = \frac{24}{\pi}$ kg m^2)

(1) 48 (2) 72
(3) 96 (4) 120

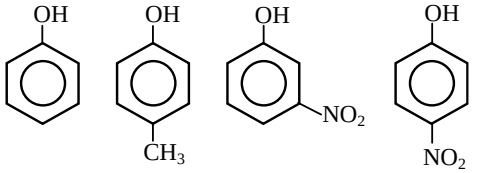
50. The radius of a soap bubble is increased from R to $2R$. Work done in this process (T = surface tension) is;

(1) $24\pi R^2T$
(2) $48\pi R^2T$
(3) $12\pi R^2T$
(4) $36\pi R^2T$

(CHEMISTRY)

SECTION-A

51. In the given substituted phenols



(I) (II) (III) (IV)

The **correct** decreasing order of acidity is;

(1) III > IV > I > II
(2) I > IV > III > I
(3) II > I > III > IV
(4) IV > III > I > II

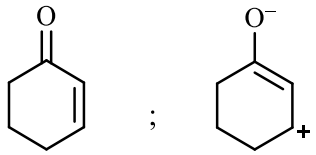
52. The reaction of cis-Hex-3-ene with Br_2 in the presence of CCl_4 produces major product;

(1) 1-Bromo-3-hexene
(2) 2,3-Dibromohexane
(3) meso-3,4-Dibromohexane
(4) (±) 3,4-Dibromohexane

53. Which of the following pairs of structures do **not** represent resonating structures?

(1) $CH_3 - \overset{\oplus}{C}(OH) - CH_3$; $CH_3 - \overset{\oplus}{C}(\ddot{O}H) - CH_3$

(2) $CH_3 - \underset{O}{\overset{\ddot{O}H}{C}} - CH_3$; $CH_3 - \underset{O^{\ominus}}{\overset{\oplus}{C}}(OH) - CH_3$

(3)  ;

(4) $CH_3 - \underset{O}{\overset{}{C}} - CH_3$; $CH_3 - \overset{OH}{C} = CH_2$

54. On reaction with water in the presence of $H_2SO_4/HgSO_4$, an alkyne give only one ketone. Alkyne can be;

(1) $CH_3–CH_2–C\equiv C–CH_3$
(2) $CH_3–(CH_2)_2–C\equiv C–CH_3$
(3) $CH_3–C\equiv C–CH_3$
(4) All of these

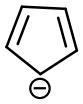
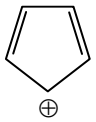
55. For the reaction:

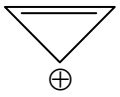
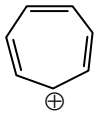
$A(g) + 3B(g) \rightleftharpoons 2C(g)$

K_C is 0.8 at 400°C. Calculate the value of K_P;

(1) 2.624×10^{-4}
(2) 2.624×10^{-6}
(3) 2.624×10^{-5}
(4) 2.624×10^{-3}

56. Which of the following species is **not** aromatic?

(1)  (2) 

(3)  (4) 

57. In a multiple bond shifting of electron under the influence of a reagent is called;

(1) Inductive effect
(2) Mesomeric effect
(3) Electromeric effect
(4) Trans effect

58. The chloride of a metal has the formula MCl. The formula of its phosphate will be;

(1) M_2PO_4
(2) MPO_4
(3) M_3PO_4
(4) $M(PO_4)_2$

59. **Statement I:** In resonance, delocalisation of σ electrons takes place.
Statement II: In hyperconjugation, delocalisation of π electrons takes place.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

60. **Assertion (A):** Fluorine exists only in +1 oxidation state.

Reason (R): Fluorine has $1s^2\ 2s^2 2p^5$ configuration.

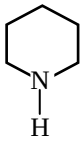
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

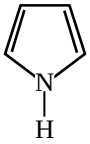
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

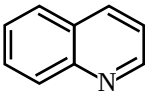
(4) **Assertion (A)** is false, and **Reason (R)** is true.

61. Compound with **highest** value pk_b is;

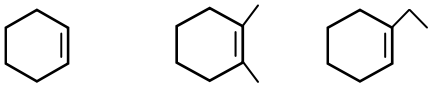
(1) 

(2) 

(3)

(4) 

62. Arrange the following alkenes in **increasing** order of stability;



(I) (II) (III)

(1) I < II < III (2) II < I < III

(3) I < III < II (4) II < III < I

63. Calculate pH of a solution of given mixture (0.1 mole CH_3COOH + 0.4 mole CH_3COONa) in 100 ml of mixture. $K_a = 3\times10^{-5}$

(1) 5.1 (2) 5.6

(3) 6.6 (4) 7.6

64. Among the following compounds which will liberate methane on treatment with NaOH and CaO in the presence of heat;

(I) $CH_3–CH_2OH$

(II) CH_3COONa

(III) H_3CCOCH_3

(IV) $H_3C–CHO$

(1) II (2) II, III

(3) I, II, III (4) I, II, III, IV

65. **Statement I:** Primary carbocations are generally formed more easily than tertiary carbocations.

Statement II: Hyperconjugation as well as inductive effect due to additional alkyl group stabilize tertiary carbocations.

(1) Statement I and Statement II both are correct.

(2) Statement I is correct, but Statement II is incorrect.

(3) Statement I is incorrect, but Statement II is correct.

(4) Statement I and Statement II both are incorrect.

66. Which of the following set of quantum numbers is **not** possible?

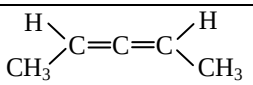
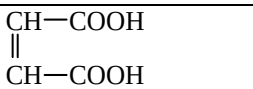
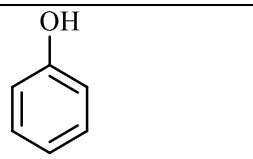
(1) n = 2, l = 1, m = 0

(2) n = 2, l = 0, m = –1

(3) n = 3, l = 0, m = 0

(4) n = 3, l = 1, m = –1

67. Match the **List-I** with **List-II** and choose the **correct** option.

List–I		List–II	
(A)		(I)	Geometrical isomerism
(B)	$HCOOC_2H_5$	(II)	Optically active
(C)		(III)	Tautomerism
(D)		(IV)	Metamerism

(1) (A) – (II), (B) – (IV), (C) – (I), (D) – (III)

(2) (A) – (I), (B) – (IV), (C) – (III), (D) – (II)

(3) (A) – (IV), (B) – (I), (C) – (II), (D) – (III)

(4) (A) – (II), (B) – (I), (C) – (IV), (D) – (III)

68. 2-Methylbut-2-ene on oxidative ozonolysis yields;

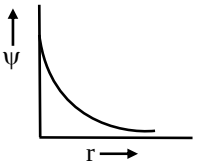
(1) only aldehyde

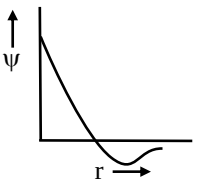
(2) only carboxylic acid

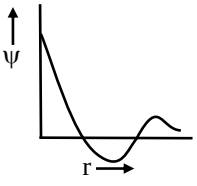
(3) Both aldehyde and ketone

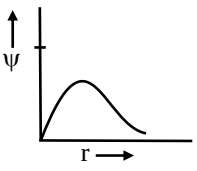
(4) Both ketone and carboxylic acid

69. Which of the following graphs correspond to one node?

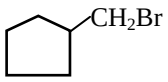
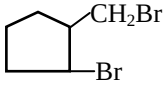
(1) 

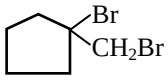
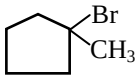
(2) 

(3) 

(4) 

70. Methylcyclopentane on monobromination in the presence of light will give X as a major product. X is;

(1)  (2) 

(3)  (4) 

71. The general formula for the pH of basic buffer is;

(1) $pH = pK_b$

(2) $pH = \frac{1}{2}pK_b - \frac{1}{2}\log\frac{[salt]}{[base]}$

(3) $pH = 14 - pK_b - \log\frac{[salt]}{[base]}$

(4) $pH = pOH - pK_b + \frac{[salt]}{[base]}$

72. Propene is heated at 500ºC with chlorine. Major product formed is;

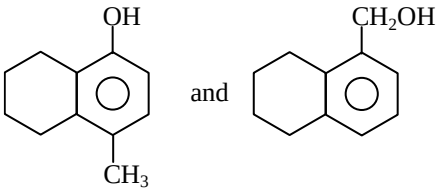
(1) $CH_2ClCH = CH_2$

(2) $CH_3CHClCH_2Cl$

(3) $CH_2ClCHClCH_2Cl$

(4) All of these

73. The given compound can be related as;



(1) metamers

(2) tautomers

(3) ring chain isomers

(4) functional isomers

74. Match **List I** with **List II** and select the **correct** answer using the codes given below the lists;

	List–I		**List–II**
(A)	$Na \xrightarrow{-e^-} Na^+$	(I)	Reduction
(B)	$Cl_2 \xrightarrow{+2e^-} 2Cl^-$	(II)	Oxidation
(C)	$4Na + O_2 \rightarrow 2Na_2O$	(III)	Redox reaction
(D)	$Br_2 \rightarrow Br^- + BrO_3^-$	(IV)	Disproportionation

(1) (A) – (II), (B) – (IV), (C) – (I), (D) – (III)

(2) (A) – (I), (B) – (IV), (C) – (III), (D) – (II)

(3) (A) – (II), (B) – (I), (C) – (III), (D) – (IV)

(4) (A) – (II), (B) – (I), (C) – (IV), (D) – (III)

75. For the given reaction, the equilibrium constant is 25.

$N_2 + 3H_2 \rightleftharpoons 2NH_3$

Calculate value of equilibrium constant for the following reaction.

$NH_3 \rightleftharpoons \frac{1}{2}N_2 + \frac{3}{2}H_2$

(1) 0.25

(2) 0.4

(3) 0.2

(4) 0.625

76. Which oxide of nitrogen is the most stable?

(1) $2NO(g) \rightleftharpoons N_2(g) + O_2(g)$; $K = 3.2 \times 10^{30}$

(2) $2NO_2(g) \rightleftharpoons N_2(g) + 2O_2(g)$; $K = 0.7 \times 10^{16}$ mol litre^{-1}

(3) $2N_2O_5(g) \rightleftharpoons 2N_2(g) + 5O_2(g)$; $K = 1.2 \times 10^{34}$ mol^5 litre^{-5}

(4) $2N_2O(g) \rightleftharpoons 2N_2(g) + O_2(g)$; $K = 5.5 \times 10^{33}$ mol litre^{-1}

77. HCl gas on reaction with propene in the presence of benzoyl peroxide will give;

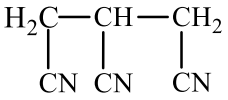
(1) n-Propyl chloride

(2) 2-Chloropropane

(3) Allyl chloride

(4) No reaction

78. The IUPAC name of the following compound is:



(1) Tricyano-1,2,3-propane

(2) Propane tricarbylamine

(3) Propane-1,2,3-tricarbonitrile

(4) 3-Cyanopropane-1,5-dinitrile

79. **Assertion (A):** If both ΔH and ΔS are positive then reaction will be spontaneous at high temperature.

Reason (R): All processes with positive entropy change are spontaneous.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

(4) **Assertion (A)** is false, and **Reason (R)** is true.

80. In the given carbocation;

$CH_3\overset{+}{C}HCH_3$ $CH_3\overset{+}{C}HOCH_3$ $CH_3\overset{+}{C}HCOCH_3$

I II III

The **correct** order of stability is;

(1) III > II > I

(2) I > II > III

(3) II > I > III

(4) I > III > II

81. Match **List I** with **List II** and select the **correct** answer using the codes given below in the lists;

List–I		List–II	
(A)	N_2O_5	(I)	+5
(B)	HNO_2	(II)	–3
(C)	NH_3	(III)	+3
(D)	HN_3	(IV)	–1/3

(1) (A)–(II), (B)–(IV), (C)–(I), (D)–(III)

(2) (A)–(I), (B)–(IV), (C)–(III), (D)–(II)

(3) (A)–(IV), (B)–(I), (C)–(II), (D)–(III)

(4) (A)–(I), (B)–(III), (C)–(II), (D)–(IV)

82. The pH of a 0.033M solution of H_3PO_4 is;

(1) 0.099 (2) 1

(3) –1 (4) 0

83. Cis-trans isomerism is **not** shown by;

(1) Butenedioic acid

(2) 1,2-Dimethylcyclopropane

(3) 1,2-Dichloroethene

(4) Butanedioic acid

84. **Assertion (A):** For the combustion of methane,

$\Delta U > \Delta H$.

Reason (R): Δn_g is +2 for the above process.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct. explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

(4) **Assertion (A)** is false, and **Reason (R)** is true.

85. **Assertion (A):** T, P and V are state variables or state functions.

Reason (R): Their values depend on the state of the system and how it is reached.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

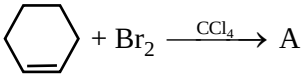
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

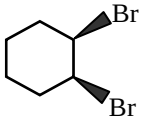
(4) **Assertion (A)** is false, and **Reason (R)** is true.

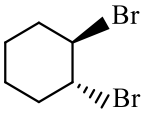
SECTION-B

86. In the given reaction:

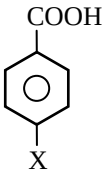


Major product 'A' will be;

(1) 

(2) 

(3) Both (1) and (2) (4) None of these

87. 

In the above compound pK_a value **decreases** if X is;

(1) $–NO_2$ (2) $–NH_2$

(3) –OH (4) $–OCH_3$

88. **Assertion (A):** The number of Oxygen atoms in 16 g of Oxygen gas and 16 g of O_3 is same.

Reason (R): Each of these species represents 1g atom of Oxygen.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

(4) **Assertion (A)** is false, and **Reason (R)** is true.

89. Calculate total number of moles of atoms present in 4.9 gm H_2SO_4.

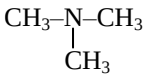
(1) 3.5 moles

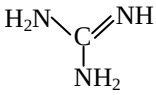
(2) 0.35 moles

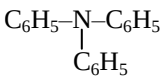
(3) 1.5 moles

(4) 2.5 moles

90. Among the given options **most** basic compound is;

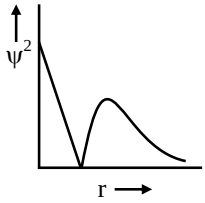
(1) 

(2) 

(3) 

(4) $CH_3—NH—CH_3$

91. The given graph between Ψ^2 (probability density) and r (distance) from the nucleus represents which orbital?



(1) 2s (2) 3s

(3) 1s (4) 2p

92. For an equilibrium change, the forward reaction involves two gaseous reactants while the reverse reaction involves one gaseous reactant.

For the forward equilibrium the unit of K_p is;

(1) atm (2) atm^2

(3) atm^{-1} (4) atm^{-2}

93. Which of the following has pOH is equal to near about one?

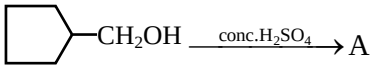
(1) 100 ml $\frac{M}{10}$ HCl + 100 ml $\frac{M}{10}$ NaOH

(2) 55 ml $\frac{M}{10}$ HCl + 44 ml $\frac{M}{10}$ NaOH

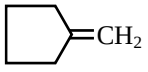
(3) 75 ml $\frac{M}{10}$ HCl + 25 ml $\frac{M}{10}$ NaOH

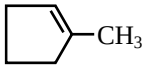
(4) 25 ml $\frac{M}{5}$ HCl + 75ml $\frac{M}{5}$ NaOH

94. For the given reaction

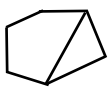


the major product 'A' is;

(1) 

(2) 

(3)

(4) 

95. In the given species:

OH^- CH_3COO^- Cl^-

I II III

The **correct** order of their basicity;

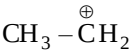
(1) III > II > I

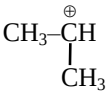
(2) III < II < I

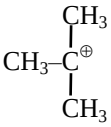
(3) II < III < I

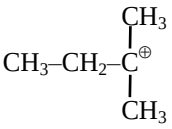
(4) II < III > I

96. **Highest** number of hyperconjugation forms will be shown by which of the following carbocation?

(1) 

(2) 

(3) 

(4) 

97. Solubility product of AgCl is 5.8×10^{-10} at 25°C. Calculate solubility of the salt in 0.01 M $AgNO_3$ solution.

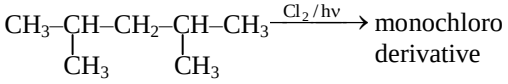
(1) 5.8×10^{-8} mol/litre

(2) 5.8×10^{-10} mol/litre

(3) 5.2×10^{-9} mol/litre

(4) 5.2×10^{-12} mol/litre

98. In the given reaction:



Total number of monochloro derivatives including stereoisomers are;

(1) 3 (2) 5

(3) 4 (4) 2

99. The reaction that will be favoured at low pressure will be;

(1) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

(2) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

(3) $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

(4) $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$

100. Calculate $[OH^-]$ in 0.002M solution of NH_3 if K_b for NH_3 is 1.8×10^{-5}.

(1) 4.24×10^{-3} M

(2) 5.24×10^{-3} M

(3) 3.24×10^{-3} M

(4) 8.24×10^{-3} M

(BOTANY)

SECTION-A

101. Out of the given functions, how many are the characteristics of the mesosomes?

i. DNA replication.
ii. Respiration.
iii. DNA distribution to daughter cells .
iv. Secretion.
v. Increase surface area.
vi. Contains enzymatic content.

(1) Only four
(2) Only Three
(3) All six
(4) Only five

102. Match **List-I** with **List-II** to find out the **correct** option.

List-I		List-II	
(I)	Mammalia	(A)	Specific epithet
(II)	*Mangifera*	(B)	Branch of study
(III)	*indica*	(C)	Class
(IV)	Systematics	(D)	Generic name

	I	II	III	IV
(1)	C	D	A	B
(2)	B	A	C	D
(3)	A	B	D	C
(4)	D	C	B	A

103. Identify the organism on the basis of the statements given below.

i. Lacks cell wall.
ii. Smallest living cell known.
iii. Can survive without oxygen.
iv. Pathogenic in animal & plants.

(1) *Nostoc* (2) *Anabaena*
(3) Mycoplasma (4) *Chlorella*

104. **Statement I:** Generally, dicot leaves have reticulate venation.
Statement II: Dicot leaves are isobilateral.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

105. In bryophytes, meiosis occurs

(1) during development of gametes.
(2) immediately after zygote formation.
(3) after sometime of zygote formation.
(4) in gametophytic stage.

106. **Statement I:** Pith is present in dicot stems and monocot roots.
Statement II: Roots have radial vascular bundles with exarch condition.

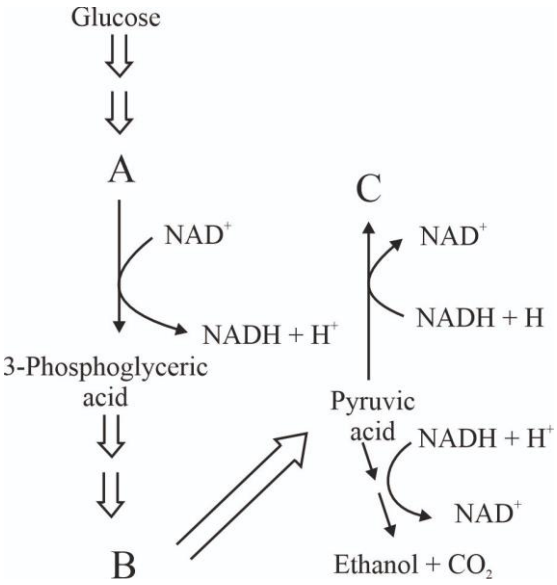
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

107. Match **List-I** with **List-II** to find out the **correct** option.

List-I		List-II	
(I)	Anaphase–I	(A)	Four daughter cells
(II)	Anaphase–II	(B)	Separation of homologous chromosomes
(III)	Metaphase-II	(C)	One metaphasic plate
(IV)	Telophase-II	(D)	Separation of two chromatids

	I	II	III	IV
(1)	B	D	A	C
(2)	C	B	D	A
(3)	B	D	C	A
(4)	A	B	C	D

108. Identify **A**, **B** and **C** in the given figure.



	A	B	C
(1)	Glyceraldehyde -3-P	Lactate	Phosphoenol pyruvate
(2)	Glyceraldehyde -3-P	Phosphoenol pyruvate	Lactate
(3)	Phosphoenol pyruvate	Glyceraldehyde-3-P	Acetyl Co-A
(4)	Phosphoenol pyruvate	Acetyl Co-A	Glyceraldehyde-3-P

109. During photosynthesis, dark reactions occur in
(1) granal thylakoid membranes.
(2) stroma of chloroplast.
(3) stromal lamellae membranes.
(4) intermembranal space of chloroplast.

110. Plasmogamy in fungi is the fusion of;
(1) two haploid gamete cells and their nuclei at once.
(2) two haploid nuclei.
(3) two haploid gamete cells.
(4) two diploid vegetative cells with nuclei.

111. Adventitious roots arise from;
(1) radicle.
(2) base of stem in tuft as in wheat.
(3) part of plant other than radicle as in banyan tree.
(4) secondary root.

112. **Assertion (A):** Action spectrum of photosynthesis as a whole is much broader than absorption spectrum of chlorophyll *a*.
Reason (R): Accessory pigments are also present in the chloroplasts which have different absorption spectra.
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

113. Calvin cycle takes place in **'i'** of all C_3 plants and **'ii'** of C_4 plants.
Choose the **correct** option.

	(i)	**(ii)**
(1)	mesophyll cells	mesophyll cells
(2)	bundle sheath cells	mesophyll cells
(3)	mesophyll cells	bundle sheath cells
(4)	bundle sheath cells	bundle sheath cells

114. RuBisCO has _____ when CO_2 and O_2 are equal in concentration around it.
(1) greater affinity for CO_2 than O_2.
(2) greater affinity for O_2 than CO_2.
(3) equal affinity for CO_2 & O_2.
(4) no affinity for O_2.

115. The respiratory balance sheet is calculated on some assumptions. Identify the **incorrect** assumption from the following statements.
(1) The pathway is sequential, with one substrate forming the next and with glycolysis, TCA cycle and ETS pathway following one after another.
(2) NADH + H^+ is transferred to chloroplast where oxidative phosphorylation occurs.
(3) Only glucose is the substrate and none other substrate or intermediate enters or leaves the pathway.
(4) None of the intermediates in the pathway are utilised to synthesise any other compound.

116. The reaction that is responsible for the primary fixation of CO_2 in C_4 plants is catalysed by;
(1) RuBP carboxylase.
(2) PEP carboxylase.
(3) RuBP carboxylase and PEP carboxylase.
(4) PGA synthase.

117. In Kreb's cycle, the first product is citric acid which is a 6-carbon compound. It is formed by a condensing irreversible reaction between:
(1) oxaloacetic acid and pyruvic acid.
(2) oxaloacetic acid and acetyl Co-A.
(3) pyruvic acid and acetyl Co-A.
(4) oxaloacetic acid and succinate.

118. **Assertion (A):** The cytoplasmic division of plant cells occurs from centre to periphery that is centrifugally.
Reason (R): The formation of the new cell wall in plants begins with the formation of a simple precursor, called the cell-plate that represents the middle lamella.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion(A)** is false, and **Reason (R)** is true.

119. Except enzyme "**A"** which is located in inner mitochondrial membrane, all enzymes of TCA cycle are located in the mitochondrial matrix in eukaryotes. This enzyme "**A"** is;
(1) isocitrate dehydrogenase.
(2) malate dehydrogenase.
(3) succinate dehydrogenase.
(4) lactate dehydrogenase.

120. Select the option which mentions **correctly** matched pair of rows.

	Stages of respiration	Place of occurrence	Products
A.	Glycolysis	Cytosol	Pyruvic acid, NADH + H^+, ATP
B.	Oxidative decarboxylation of pyruvic acid	Mitochondrial matrix	Acetyl CoA, NADH+ H^+, CO_2
C.	Krebs' cycle	Peri-mitochondrial space	CO_2, NADH + H^+, ATP
D.	Electron transport system	Inner membrane of mitochondria	ATP, CO_2

(1) A and B (2) B and C
(3) C and D (4) D and A

121. In ETS, the terminal electron acceptor reduces into
(1) water. (2) CO_2.
(3) ATP. (4) O_2.

122. The scientist that hypothesised, "plants restore to the air the substances removed by breathing animals and burning candles" is;
(1) Joseph Priestley.
(2) Jan Ingenhousz.
(3) Julius Von Sachs.
(4) T.W Engelmann.

123. **Assertion (A):** Only cyclic photophosphorylation takes place in stroma lamellae.
Reason (R): Stroma lamellae membranes lack PS II as well as NADP reductase enzyme.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion(A)** is false, and **Reason (R)** is true.

124. In the light reaction, splitting of the water molecule takes place on/in the
(1) stromal side of thylakoid membrane.
(2) stroma of chloroplast.
(3) inner side of thylakoid membrane.
(4) inter-membranal space of the chloroplast membrane.

125. The most crucial step of Calvin cycle is;
(1) reduction of atmospheric CO_2.
(2) fixation of CO_2.
(3) regeneration of RuBP.
(4) splitting of H_2O molecule.

126. **Statement I:** The biosynthetic phase of photosynthesis does not directly depend on the presence of light but is dependent on the products of the light reaction.
Statement II: Even after light becomes unavailable, the biosynthetic process continues indefinitely without stopping.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

127. For the synthesis of a sucrose molecule, the number of ATP and NADPH molecules required in the Calvin cycle, respectively, is
(1) 18 and 12.
(2) 12 and 18.
(3) 36 and 24.
(4) 24 and 36.

128. The product(s) of photorespiration is/are
(1) a 2-C compound only.
(2) a 3-C compound only.
(3) a 2-C compound and a 3-C compound.
(4) two 3-C compounds.

129. Pick the **correct** statement from the following.
(1) All animals are saprophytic.
(2) Plants also need to oxidise food for energy needs.
(3) The breaking of the C-C bonds of complex compounds through oxidation within the cells, leading to release of considerable amount of energy is called photosynthesis.
(4) Usually, proteins are oxidised to release energy, but carbohydrates, fats and even organic acids can be used as respiratory substances in some plants, under certain conditions.

130. Match **List-I** with **List-II** to find out the **correct** option.

List-I		List-II	
(I)	First stable product of Calvin cycle	(A)	Pyruvate
(II)	First product of hatch and slack pathway	(B)	OAA
(III)	Product of EMP pathway	(C)	3-PGA

(1) I(C), II(B), III(A)
(2) I(A), II(C), III(B)
(3) I(A), II(B), III(C)
(4) I(C), II(A), III(B)

131. CO_2 is not released during the
(1) conversion of pyruvate to ethanol.
(2) conversion of pyruvate to acetyl Co. A.
(3) conversion of pyruvate to lactate.
(4) conversion of malic acid to a 3-C compound.

132. In the ETS, $FADH_2$ donates its electrons to
(1) complex IV. (2) complex II.
(3) complex III. (4) complex I.

133. The RQ of protein is higher than that of
(1) sugar. (2) organic acid.
(3) glucose. (4) tripalmitin.

134. During aerobic respiration, the metal ion required for the activity of pyruvate dehydrogenase is
(1) Mg^{2+}. (2) Mn^{2+}.
(3) Fe^{2+}. (4) Cu^{2+}.

135. Identify the **correct** statement.
(1) Tropical plants have higher temperature optimum than temperate plants.
(2) Temperate plants have higher temperature optimum than tropical plants.
(3) Temperate and tropical have equal temperature optimum.
(4) None of these.

SECTION-B

136. **Statement I:** Plant cells differ from animal cells.
Statement II: Plant cells possess cell wall, plastids & a large vacuole which is absent in animal cells.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

137. The 'Suffix' used for a unit of classification in plants to indicate 'family' taxonomic category is;
(1) -ales. (2) -onae.
(3) -aceae. (4) -adae.

138. The synonym of light reaction of photosynthesis is
(1) photochemical phase.
(2) biosynthetic phase.
(3) preparatory phase.
(4) payoff phase.

139. **Statement I:** The cones bearing megasporophyll with ovules are female cones.
Statement II: The strobili bearing microsporangia are called male cones.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

140. Match **List-I** with **List-II** to find out the **correct** option w.r.t ETS.

List-I		List-II	
(I)	Complex I	(A)	Cytochrome bc_1
(II)	Complex II	(B)	Cytochrome c oxidase
(III)	Complex III	(C)	NADH dehydrogenase
(IV)	Complex IV	(D)	Succinate dehydrogenase

(1) I(C), II(D), III(A), IV(B)
(2) I(A), II(C), III(B), IV(D)
(3) I(A), II(B), III(C), IV(D)
(4) I(C), II(A), III(B), IV(D)

141. **Statement I:** Cytochrome c is a small protein attached to the outer surface of the inner mitochondrial membrane.
Statement II: F_0 is an integral membrane protein complex of ATP synthase that forms the channel through which protons cross the inner membrane.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

142. The **correct** sequence of stages in cell cycle is:
(1) $M \rightarrow G_2 \rightarrow S \rightarrow G_1$
(2) $S \rightarrow G_2 \rightarrow G_1 \rightarrow M$
(3) $M \rightarrow G_1 \rightarrow G_2 \rightarrow S$
(4) $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$

143. Electrons from PS-I move downhill to a molecule of energy-rich
(1) $NADP^+$.
(2) NAD^+.
(3) FAD^+.
(4) GTP.

144. Among the following, secondary growth is seen in:
A – dicot root B – dicot stem
C – monocot root D – monocot stem
E – monocot leaf F – dicot leaf
Choose the **correct** option.
(1) A, B, C and D
(2) C, D, E and F
(3) A, B, E and F
(4) A and B only

145. Match **List-I** with **List-II** to find out the **correct** option.

List-I (color in chromatogram)		**List-II (photosynthetic pigment)**	
(I)	Yellow to yellow-orange	(A)	Carotenoids
(II)	Yellow	(B)	Chlorophyll *a*
(III)	Yellow green	(C)	Xanthophylls
(IV)	Bright or blue green	(D)	Chlorophyll *b*

	I	**II**	**III**	**IV**
(1)	D	C	B	A
(2)	A	B	C	D
(3)	A	C	D	B
(4)	D	B	A	C

146. In a greenhouse, the concentration of CO_2 was increased from 380 μlL^{-1} to 400 μlL^{-1}. Its effect will be
(1) increase in productivity of C_4 plants.
(2) increase in productivity of C_3 plants.
(3) decrease in productivity of C_3 plants.
(4) increase or decrease in productivity of C_4 plants.

147. In PS I, the reaction centre of chlorophyll *a* has an absorption peak at
(1) 700 mm.
(2) 680 mm.
(3) 680 nm.
(4) 700 nm.

148. Glycolysis is also called
(1) TCA cycle
(2) link reaction
(3) EMP pathway
(4) ETS

149. **Assertion (A):** There can be a net gain of 38 ATP molecules during aerobic respiration of one molecule of glucose.
Reason (R): One molecule of $NADH + H^+$ and $FADH_2$ produces 2 and 3 ATP respectively through ETS.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion(A)** is false, and **Reason (R)** is true.

150. Mark the **incorrect** statement among the following.
(1) Oxygen drives the whole process of aerobic respiration by removing hydrogen from the system.
(2) The activity of ATP synthase utilises ATP.
(3) Glycolysis is present in all living organisms.
(4) Sucrose is converted into glucose and fructose by the enzyme invertase.

(ZOOLOGY)

SECTION-A

151. **Statement I:** Exopthalmic goitre is a form of hypothyroidism, characterised by enlargement of the thyroid gland.
Statement II: Parathyroid gland secretes a protein hormone called thyrocalcitonin (TCT) which regulates the blood calcium levels.
(1) Statement I and statement II both are correct.
(2) Statement I is correct, but statement II is incorrect.
(3) Statement I is incorrect, but statement II is correct.
(4) Statement I and statement II both are incorrect.

152. Which part of nephron is impermeable to water but allows transport of electrolytes actively or passively?
(1) Distal convoluted tubule
(2) Proximal convoluted tubule
(3) Descending limb of loop of Henle
(4) Ascending limb of loop of Henle

153. Which of the following is **incorrect** about pituitary?
(1) Located in bony cavity called sella turcica.
(2) Attached to hypothalamus by stalk.
(3) Divided anatomically into adenohypophysis and neurohypophysis.
(4) Secretes releasing and inhibitory hormones.

154. Which of the following organ contains several groups of neurosecretory cells called nuclei which produce hormones?
(1) Posterior pituitary
(2) Anterior pituitary
(3) Hypothalamus
(4) Parathyroid gland

155. Which of the following protein polymerize to form thick filament of muscle fibre?
(1) Globular actin (2) Filamentous actin
(3) Troponin (4) Meromyosin

156. Match **List-I** with **List-II** regarding the hormone with the endocrine gland who release it and choose the **correct** option.

List-I		List-II	
(A)	Gonadotropin releasing hormone	(I)	Neurohypophysis
(B)	Thyroid stimulating hormone	(II)	Pars intermedia
(C)	Antidiuretic hormone	(III)	Hypothalamus
(D)	Melanocyte stimulating hormone	(IV)	Adenohypophysis

	A	B	C	D
(1)	III	I	IV	II
(2)	IV	III	II	I
(3)	III	IV	I	II
(4)	IV	III	I	II

157. All of the following are the hormones released by adenohypophysis **except**;
(1) Follicle stimulating hormone
(2) Prolactin
(3) Adrenocorticotrophic hormone
(4) Aldosterone

158. Which of the following hormone produces anti-inflammatory reactions and suppresses the immune response?
(1) Insulin
(2) Glucagon
(3) Vasopressin
(4) Cortisol

159. Which of the following options is **not** a function of glucagon?
(1) It acts mainly on the liver cells (hepatocytes) and stimulates glycogenesis.
(2) It causes hyperglycemia.
(3) It stimulates the process of gluconeogenesis which also contributes to hyperglycemia.
(4) It reduces the cellular glucose uptake and utilization.

160. Corpora quadrigemina are present on _____ portion of midbrain.
(1) Anterior (2) Dorsal
(3) Ventral (4) Lateral

161. ACTH stimulates the synthesis and secretion of steroid hormones called **__A__** from the **__B__**.
Choose the option **correctly** filling the value of **A** and **B**.

	A	B
(1)	glucocorticoids	adrenal medulla
(2)	mineralocorticoids	adrenal medulla
(3)	glucocorticoids	adrenal cortex
(4)	androgen	adrenal medulla

162. Oxygen dissociation curve is obtained when partial pressure of oxygen is plotted against;
(1) partial pressure of CO_2.
(2) percentage saturation of hemoglobin with O_2.
(3) partial pressure of O_2 in alveoli.
(4) percentage saturation of hemoglobin with CO_2.

163. Which of the following options **incorrectly** explain the function of hormone in human body?

(1) Prolactin regulates the growth of the mammary glands and formation of milk in them.
(2) TSH stimulates the synthesis and secretion of thyroid hormones from the thyroid gland.
(3) In males, LH stimulates the synthesis and secretion of hormones called androgens from testis.
(4) In females, FSH induces ovulation of fully mature follicles (graafian follicles) and maintains the corpus luteum.

164. Which of the following hormones of anterior pituitary together called gonadotropins?

(1) LH and ACTH
(2) FSH and LH
(3) TSH and PRL
(4) MSH and LH

165. In ABO system, blood group O is considered as universal donor because;

(1) it contains no antibodies in plasma.
(2) it contains no antigen on RBCs.
(3) it contains both antigen A and B on RBCs.
(4) it contains antibody anti-A in plasma.

166. Secretion of which hormone is regulated by circulating levels of calcium ions in the body?

(1) Thymosin
(2) Parathyroid
(3) MSH
(4) TSH

167. Diuresis is reduced by;

(1) Oxytocin (2) Prolactin
(3) LH (4) Vasopressin

168. Match **List-I** with **List-II** regarding respiratory capacities and choose the **correct** option.

List-I		**List-II**	
(A)	Inspiratory capacity	(I)	RV+ERV+TV + IRV
(B)	Expiratory capacity	(II)	ERV+RV
(C)	Total lung capacity	(III)	TV+IRV
(D)	Functional residual capacity	(IV)	TV+ERV

	A	**B**	**C**	**D**
(1)	III	IV	II	I
(2)	II	III	IV	I
(3)	IV	III	II	I
(4)	III	IV	I	II

169. **Assertion (A):** Pancreas is a composite gland which acts as both exocrine and endocrine gland.
Reason (R): The exocrine pancreas consists of 'Islets of Langerhans'.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

170. Which of the following statement is **incorrect** regarding function of androgens?

(1) It regulate the functions of the male accessory sex organs.
(2) These hormones stimulate muscular growth, growth of facial and axillary hair etc.
(3) It play a major stimulatory role in the process of spermatogenesis.
(4) These hormones produce catabolic effects on protein and carbohydrate metabolism.

171. The juxtaglomerular cells of kidney produce a peptide hormone called _____ which stimulates formation of RBCs.

(1) erythropoietin (2) renin
(3) angiotensin II (4) angiotensin I

172. Secretin hormone which stimulates secretion of water and bicarbonate ions acts on;

(1) gall bladder.
(2) exocrine pancreas.
(3) endocrine pancreas.
(4) spleen.

173. Which of the following is **not** a false statement?

(1) Fibrins are formed by the enzyme prothrombin.
(2) Prothrombin, are formed from thrombin.
(3) Thrombokinase, is required for conversion of thrombin into prothrombin.
(4) An injury or a trauma stimulates the platelets in the blood to release certain factors which activate the mechanism of coagulation.

174. The amount of the filtrate formed by the kidneys per minute is called glomerular filtration rate which is in a healthy individual is approximately;

(1) 125 ml/minute
(2) 180 L/hour
(3) 125L/day
(4) 180 ml/minute

175. Select the option which **correctly** matches.

(1)	Peptide hormone	Insulin
(2)	Steroid hormone	Pituitary hormone
(3)	Amino acid derivatives	Gonadotropin
(4)	Iodothyronines	Epinephrine

176. Which of the following statements is **not** correct regarding mechanism of hormone action?

(1) Hormone receptors are located in all the tissues of the body.

(2) Hormone receptors present on the cell membrane of the target cells are called membrane bound receptors.

(3) The receptors present inside the target cell are called intracellular receptors.

(4) Binding of a hormone to its receptor leads to the formation of a hormone-receptor complex.

177. Transmission of an impulse across _____ is very similar to impulse conduction along a single axon.

(1) electrical synapses

(2) chemical synapses

(3) myelinated nerve fiber

(4) cranial nerves

178. Which of the following disorder is a result of prolonged hyperglycemia?

(1) Diabetes insipidus

(2) Diabetes mellitus

(3) Addison's disease

(4) Atherosclerosis

179. Select the **incorrect** statement regarding mechanism of muscle contraction.

(1) Muscle contraction is initiated by a signal sent by the central nervous system (CNS) via a motor neuron.

(2) The junction between a motor neuron and the sarcolemma of the muscle fibre is called motor-end plate.

(3) A neural signal reaching neuromuscular junction releases a neurotransmitter (acetylcholine) which generates an action potential in the sarcolemma.

(4) The action potential spreads through the muscle fibre and causes the release of sodium ions into the sarcoplasm.

180. Match **List-I** with **List-II** regarding hormone and its function and choose the **correct** option.

List-I		**List-II**	
(A)	Hyperglycemic hormone	(I)	Glucagon
(B)	Hypoglycemic hormone	(II)	Insulin
(C)	Glucocorticoid	(III)	Aldosterone
(D)	Mineralocorticoid	(IV)	Cortisol

	A	**B**	**C**	**D**
(1)	II	I	IV	III
(2)	II	I	III	IV
(3)	I	II	IV	III
(4)	III	II	I	IV

181. **Statement I:** The estrogen is synthesized and secreted mainly by the growing ovarian follicles.
Statement II: After ovulation, the ruptured follicle is converted to a structure called corpus luteum, which secretes mainly estrogen.

(1) Statement I and statement II both are correct.

(2) Statement I is correct, but statement II is incorrect.

(3) Statement I is incorrect, but statement II is correct.

(4) Statement I and statement II both are incorrect.

182. A four chambered heart with two atria and two ventricles is present in;

(1) Fishes (2) Amphibians

(3) Reptiles (4) Crocodile

183. Match **List-I** with **List-II** and choose the **correct** option.

List-I		**List-II**	
(A)	Acute renal failure	(I)	Inflammation of glomeruli
(B)	Uremia	(II)	Insoluble mass of crystalline salts
(C)	Renal calculi	(III)	Excess of urea in blood
(D)	Glomerulone phritis	(IV)	One or both kidneys do not function properly

	A	**B**	**C**	**D**
(1)	I	II	IV	III
(2)	IV	III	II	I
(3)	IV	III	I	II
(4)	III	II	I	IV

184. Thymosin is responsible for;

(1) raising the blood sugar level.

(2) raising blood calcium level.

(3) increased production of T-lymphocyte.

(4) decrease in RBC count in blood.

185. Which of the following hormone acts on the gastric glands and stimulates the secretion of hydrochloric acid and pepsinogen.
(1) Gastric inhibitory peptide
(2) Gastrin
(3) Secretin
(4) Cholecystokinin

SECTION-B

186. **Assertion (A):** Hormones which interact with intracellular receptors normally do not enter the target cell, but generate second messengers.
Reason (R): Steroid hormones mostly regulate gene expression or chromosome function by the interaction of hormone-receptor complex with the genome.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

187. How many of the following statements are **correct**?
A. Osmoreceptors in the body are activated by changes in blood volume, body fluid volume and ionic concentration.
B. An excessive loss of fluid from the body can activate these receptors which stimulate the hypothalamus to release antidiuretic hormone (ADH) or vasopressin from the adenohypophysis.
C. ADH facilitates water reabsorption from loop of Henle, thereby preventing diuresis.
D. An increase in body fluid volume can switch off the osmoreceptors and suppress the ADH release to complete the feedback.
(1) One (2) Two
(3) Three (4) Four

188. **Statement I:** The thyroid gland is a lobular structure located between lungs behind sternum on the ventral side of aorta.
Statement II: Thymus gland secretes the steroid hormones called thymosin.
(1) Statement I and statement II both are correct.
(2) Statement I is correct, but statement II is incorrect.
(3) Statement I is incorrect, but statement II is correct.
(4) Statement I and statement II both are incorrect.

189. Which of the following set of bones constitute the axial skeleton?
(1) The skull, vertebral column, ribs and pelvic girdle.
(2) The skull, vertebral column, ribs and pectoral girdle.
(3) The skull, pectoral girdle, vertebral column and appendages.
(4) The skull, vertebral column, sternum and ribs.

190. If levels of thyroid hormones are low during pregnancy, which of the following disorder will be present in developing baby?
(1) Goitre
(2) Cretinism
(3) Exopthalmic goitre
(4) Myxedema

191. **Assertion (A):** The parathyroid glands secrete a peptide hormone called parathyroid hormone (PTH).
Reason (R): The secretion of PTH is regulated by the circulating levels of calcium ions.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

192. Which of the following statement is **not true** regarding structure of neuron?
(1) A neuron is a microscopic structure composed of three major parts, namely, cell body, dendrites and axon.
(2) The cell body contains cytoplasm with typical cell organelles and certain granular bodies called Nissl's granules.
(3) Short fibres which branch repeatedly and project out of the cell body also contain Nissl's granules and are called dendrites.
(4) The axon is a long fibre, the proximal end of which is branched.

193. Which one of the following statements **correctly** represents the function of oxytocin hormone?
(1) It stimulates a vigorous contraction of uterus at the time of child birth, and milk ejection from the mammary gland.
(2) It regulates the growth of the mammary glands and formation of milk in them.
(3) It produces wide ranging actions such as stimulation of growth and activities of female secondary sex organs.
(4) It acts on the mammary glands and stimulates the formation of alveoli (sac-like structures which store milk) and milk secretion.

194. Match **List-I** with **List-II** and choose the **correct** option.

List-I		List-II	
(A)	Larynx	(I)	Lid of larynx
(B)	Trachea	(II)	Air sacs
(C)	Alveoli	(III)	Voice box
(D)	Epiglottis	(IV)	Wind pipe

	A	B	C	D
(1)	III	IV	II	I
(2)	III	IV	I	II
(3)	IV	III	II	I
(4)	IV	III	I	II

195. Which of the following set of hormones is secreted from adrenal gland?

(1) Epinephrine, norepinephrine, erythropoietin and cortisol.
(2) Catecholamines, cortisol, aldosterone and androgens.
(3) Epinephrine, norepinephrine, mineralocorticoids, glucocorticoids and ACTH.
(4) Androgens, catecholamines, cortisol, aldosterone, erythropoietin and renin.

196. **Statement I:** Cortisol is involved in maintaining the cardio vascular system as well as kidney function.
Statement II: Glucocorticoids stimulate glycogenesis, lipolysis and proteolysis; and stimulate cellular uptake and utilization of amino acids.

(1) Statement I and statement II both are correct.
(2) Statement I is correct, but statement II is incorrect.
(3) Statement I is incorrect, but statement II is correct.
(4) Statement I and statement II both are incorrect.

197. The atrial wall of our heart secretes a very important peptide hormone called atrial natriuretic factor (ANF) which;

(1) increases blood pressure.
(2) increases heart rate.
(3) decreases blood pressure.
(4) has no effect on blood pressure.

198. The **___X___** secrete a hormone called **___Y___** which acts mainly on the liver cells (hepatocytes) and stimulates glycogenolysis resulting in an increased blood sugar.
Choose the option **correctly** filling the value of **X** and **Y**.

	X	Y
(1)	α-cells	glucagon
(2)	β-cells	insulin
(3)	α-cells	insulin
(4)	β-cells	glucagon

199. **Assertion (A):** The nodal musculature has the ability to generate action potentials without any external stimuli, i.e., it is auto excitable.
Reason (R): The number of action potentials that could be generated in a minute vary at different parts of the nodal system.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

200. Which of the following hormone inhibits gastric secretion and motility?

(1) Gastrin
(2) Gastric inhibitory peptide
(3) Secretin
(4) Cholecystokinin

■■■

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